# Amino acid composition of poinsettia cultivars: effects on whitefly preference


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## Abstract


- Free soluble amino acids were profiled for seven poinsettia, *Euphorbia pulcherrima* Willd. ex Klotzsch, cultivars (*cv.*).
- Preference and performance of the silverleaf whitefly, *Bemisia tabaci* (Gennadius) biotype B, were evaluated on these seven cultivars.
- Cultivars had the same profile of amino acids, but some cultivars differed in the total concentration.
- Whitefly adults settled significantly less on *cv.* Freedom compared to other cultivars, except from Early Freedom. Oviposition was higher on lighter green leaf cultivars compared to dark green leaf ones.
- Survivorship function of whiteflies was significantly different among cultivars.
- Lighter green leaf cultivars showed a tendency to be preferred and be better hosts for *B. tabaci* biotype B.


## Introduction

- The silverleaf whitefly, *B. tabaci* biotype B, is one of the most important and prevalent insects attacking poinsettias: weakening the plant and causing aesthetic problems (Van Driesche and Lyon 2003).

- Understanding whitefly performance and preference for poinsettia cultivars can help improve pest management.

## Objectives

- Determine the amino acid composition of seven poinsettia cultivars.

- Determine the preference and performance of the silverleaf whitefly on these seven poinsettia cultivars.

## Methods

- **Amino acids:** EZ:faast kit method for free amino acids was used (Phenomex, Inc.).

- **Choice preference test:** Whitefly adults were released in five mesh cages (70x70x40 cm), each with seven cultivars and180 whitefly pairs. Oviposition and adults settled after 24 h were measured.

- **No-choice test:**
  - Three clip cages per plant were used to infest with whiteflies (Fig. 1a).
  - Survivorship was observed on ≥ 90 nymphs per cultivar (Fig. 1b).

- **Data analysis:** Randomized complete block design via ANOVA (SAS). Mean separation analysis of adults settled, oviposition, and total concentration of amino acids via least significant difference test (LSD). Nymph developmental time via survivorship analysis.

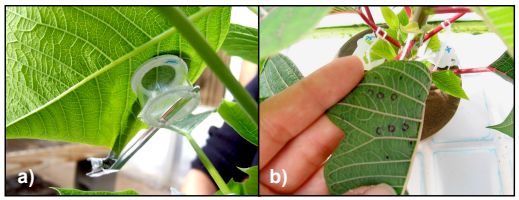



**Fig. 1 . No-choice test.**
a) Clip cages with 6 whitefly pairs each; b) Six nymphs per leaf on 3 leaves per plant.

## Results

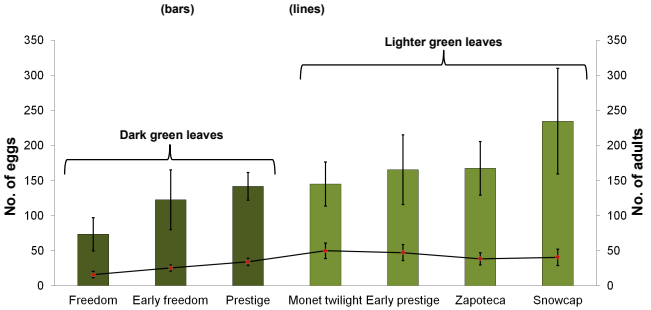
**Amino acid composition of poinsettia cultivars nmol•mg$^{-1}$**

| Amino acid | Zapoteca (light) | Snowcap (light) | Freedom (dark) | Monet twilight (light) | Prestige (dark) | Early freedom (dark) | Early prestige (light) |
|---|---|---|---|---|---|---|---|
| Alanine | 0.82 | 0.69 | 0.80 | 0.58 | 0.72 | 0.43 | 0.35 |
| Glycine | 0.17 | 0.21 | 0.16 | 0.14 | 0.17 | 0.11 | 0.12 |
| Valine | 0.06 | 0.15 | 0.14 | 0.09 | 0.09 | 0.07 | 0.06 |
| Leucine | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 |
| Isoleucine | 0.00 | 0.00 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 |
| Threonine | 0.12 | 0.23 | 0.16 | 0.11 | 0.14 | 0.11 | 0.03 |
| Serine | 3.41 | 1.36 | 2.38 | 3.84 | 2.21 | 2.31 | 2.12 |
| Proline | 0.31 | 0.09 | 0.05 | 0.02 | 0.03 | 0.03 | 0.02 |
| Aspartic acid | 0.72 | 0.85 | 0.65 | 0.54 | 0.41 | 0.53 | 0.41 |
| Methionine | 0.02 | 0.01 | 0.02 | 0.05 | 0.03 | 0.03 | 0.05 |
| Glutamic acid | 3.27 | 2.97 | 2.71 | 2.25 | 2.27 | 1.84 | 1.86 |
| Phenylalanine | 0.03 | 0.05 | 0.06 | 0.04 | 0.04 | 0.02 | 0.03 |
| Glutamine | 1.94 | 2.99 | 1.80 | 1.24 | 1.79 | 1.16 | 0.99 |
| Lysine | 0.02 | 0.01 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 |
| Histidine | 0.11 | 0.25 | 0.21 | 0.18 | 0.19 | 0.13 | 0.18 |
| Tyrosine | 0.11 | 0.09 | 0.12 | 0.09 | 0.10 | 0.07 | 0.10 |
| Triptophan | 0.00 | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **TOTAL[1]** | **11.12 a** | **9.97 ab** | **9.37 abc** | **9.22 abc** | **8.26 bcd** | **6.89 cd** | **6.35 d** |

[1] LSD, same letters are not significantly different at alpha=0.05.

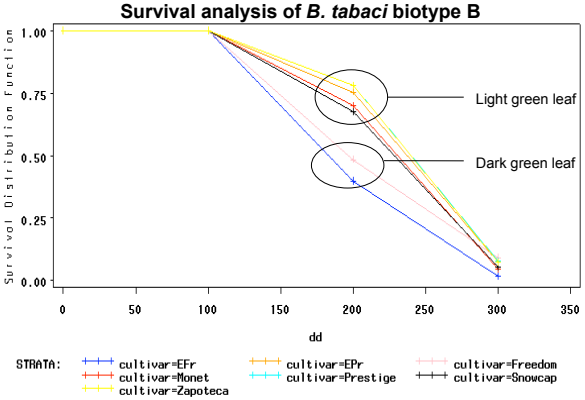
- Total concentration of amino acids varied significantly among poinsettia cultivars ($F_{(6, 24)}$=3.97, P=0.006).

**Oviposition and settling of whiteflies**




- Oviposition was not significantly different among cultivars ($F_{(6, 24)}$=1.47, P=0.23), but it tends to be higher on lighter green leaf cultivars.
- Settling preference of *B. tabaci* differed among poinsettia cultivars ($F_{(6, 24)}$=2.52, P=0.0494).
- Significantly less whiteflies preferred settling on *cv.* Freedom compared to all other *cv.*, except when compared to *cv.* Early freedom (LSD,alpha=0.05).

**Survival analysis of *B. tabaci* biotype B**




- Survival distribution function was significantly different among cultivars (Log-Rank, $X^2$=44.49, P < 0.0001).
- In general, lighter green leaf cultivars were better hosts for *B. tabaci* biotype B compared to dark green leaf ones.

## Conclusions

- Total amino acid concentration, in general, was higher for light green leaf poinsettias compared to dark green leaf ones.
- Similarly, whitefly oviposition and adult settling was higher on light green leaf poinsettias compared to dark green leaf cultivars.
- Performance of *B. tabaci* biotype B tends to be more affected by dark green leaf cultivars compared to light green leaf ones.
- Amino acid composition may be associated to preference and performance of *B. tabaci* biotype B.
- Further analyses will be conducted to study the effect of light vs dark green leaf cultivars on the silverleaf whitefly.

## Acknowledgements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## Reference


- Van Driesche, R.G., and Lyon, S. 2003. Commercial adoption of biological control-based IPM for whiteflies in poinsettias. Florida Entomol. 86 (3): 481-483.